WHEN DOES CASH MATTER? EVIDENCE FOR PRIVATE FIRMS

Paul Ehling and David Haushalter

Documentos de Trabajo
N.º 1412

2014

BANCO DE ESPAÑA
Eurosistema

WHEN DOES CASH MATTER? EVIDENCE FOR PRIVATE FIRMS [(*)]

Paul Ehling [(**)]

BI NORWEGIAN BUSINESS SCHOOL

David Haushalter [(***)]

SHEAL COLLEGE OF BUSINESS

Abstract

Using a database of more than 180,000 private companies from 2000 to 2009, we find that the benefits of holding more cash vary substantially with a firm's size and the conditions it faces. Cash holdings matter most for small firms: when there are negative shocks to industry or macroeconomic conditions, a small firm's cash holdings are positively associated with changes in its sales and assets. Cash is less important for other conditions. Differences in the benefits of cash holdings between large and small firms are traced to a firm's ability – and willingness – to increase leverage when there is a cash shortfall.

Keywords: cash holdings, benefits of cash holdings, private companies.

JEL classification: G30, G32, G35.

Resumen

Utilizando una base de datos de más de 180.000 empresas privadas desde el año 2000 hasta el 2009, encontramos que los beneficios de mantener más efectivo varían sustancialmente dependiendo del tamaño y de la situación de cada compañía. La tenencia de liquidez afecta, fundamentalmente, a las pequeñas empresas. En casos de *shocks* negativos en la industria o en la situación macroeconómica, la tenencias de efectivo por parte de empresas pequeñas se asocia positivamente a los cambios en sus ventas y activos. La liquidez es menos relevante en otros casos. Las diferencias en los beneficios por mantener efectivo entre grandes y medianas empresas se relaciona con la capacidad, y voluntad, de cada una de ellas de aumentar el apalancamiento cuando hay un déficit de capital.

Palabras clave: tenencias de efectivo, beneficios de las tenencias de capital, empresas privadas.

Códigos JEL: G30, G32, G35.

INTRODUCTION

Although the vast majority of firms in Europe, Japan, and the United States are small and privately owned, most empirical research of corporate financial policies examines large publicly traded corporations for which data are more widely available.[1] What we do know about the financial policies of private firms is that they differ from public firms. Private firms have choppier dividends, invest more, hold less cash, are more levered, and rarely borrow long term debt or sell equity when compared to similar public firms.[2] Moreover, there are important differences in exposures to financing risks. For example, Gertler and Gilchrist (1994) show that small businesses, which account for the vast majority of private firms, are more sensitive to an increase in interest rates than larger businesses. Others have argued that private firms face greater sensitivities to venture capitalists' ability to raise capital and to decreases in housing prices.

In this paper, we provide evidence on the financial policies of private firms by studying the value of cash holdings. We use a large database of private companies from 2000 to 2009 to examine questions regarding the types of private firms for which cash holdings are most valuable, when cash holdings are most valuable, and why cash holdings are more valuable for some firms than others.[3]

The literature on the value of cash holdings has focused on public companies. This literature is somewhat divided. There is compelling evidence in Harford (1999),

---

[1] For example, the United States Census reports that among employers, 89 percent have less than 20 employees. Firms with less than 500 employees, which are almost exclusively privately held, account for roughly half of the employment in the United States. (See http://www.census.gov/econ/smallbus.html.) Private companies are also a large part of the economy in other countries. For example, Brav (2009) reports that two thirds of assets in the UK are owned by private firms.

[2] See Petersen and Rajan (1994), Brav (2009), Asker, Farre-Mensa, and Ljungqvist (2012), Gao, Harford, and Li (2012), Michaely and Roberts (2012), and others.

[3] The database contains over 238,000 firms. More than 180,000 firms pass the data filters for our analysis.

Dittmar and Mahrt-Smith (2007), Harford, Mansi, and Maxwell (2008), Nikolov and Whited (2010) and other studies indicating that high cash holdings can reflect – or even lead to – agency problems and destroy shareholder value. There are also, however, well developed arguments for cash holdings increasing shareholder value. Most notably, a line of literature including Opler, Pinkowitz, Stulz, and Williamson (1999), Almedia, Campello, and Weisbach (2004), Bates, Kahle, and Stulz (2009) and others emphasize the precautionary benefits of cash and show that firms more likely to face financial constraints hoard relatively more cash. A general theme of these arguments is that high cash holdings can provide a valuable hedge against downturns in internal cash flow. Cash holdings can reduce a firm's dependence on external financing during downturns and increase its ability to take on value increasing projects. Empirically, the value of cash holdings for public firms appears to be greatest for constrained firms and around negative shocks to operating or financial conditions.[4]

There are several reasons why cash holdings can be particularly valuable for private firms. First, as discussed by Gao, Harford, and Li (2012) and Asker, Farre-Mensa, and Ljungqvist (2012), because private firms are closely held, agency conflicts between owners and managers are of less concern than for public firms. Second, given the size and other characteristics of private firms, they often have fewer

---

[4]The value of cash holdings for publicly listed firms in the U.S. is studied by Harford, Mikkelson, and Partch (2003), Faulkender and Wang (2006), Acharya, Almeida, and Campello (2007), Denis and Sibilkov (2010), Duchin, Ozbas, and Sensoy (2010), and Fresard (2010). Harford, Mikkelson, and Partch (2003) and Duchin, Ozbas and Sensoy (2010) examine performance around shocks. Harford et al (2003) study industry downturns. Duchin, et al (2010) study performance around the subprime financial crisis. These papers show that a firm's performance and investment around these events is positively associated with its cash holdings. Faulkender and Wang (2006) find a greater value is placed on cash holdings if a firm is financially constrained. Acharya, Almeida, and Campello (2007) show that cash holdings are greater for firms facing difficulties financing investment opportunities. Denis and Sibilkov (2010) find that cash holdings enable constrained firms to fund value increasing investments. Fresard (2010) finds firms that hold more cash than rivals realize greater subsequent increases in market share, especially in competitive market and around shocks to competition.

sources of financing and can face greater difficulties raising capital externally than public firms. Finally, because private firms often lack the expertise or other resources needed to use financial derivatives, cash holdings can be one of the few ways they can manage risks. Our goal is to provide evidence on the extent to which cash holdings matter for private firms and whether the value of cash holdings varies across firms and conditions.

Our sample is from a database of all limited liability firms incorporated in Norway and includes a firm's annual balance sheet and income statement. This database also includes information on a company's ownership and compensation structure as well as the relationships between its owners, officers, and directors. In general, the companies in the database are very small when compared to public companies in Europe, Japan and the United States: the median firm in the second largest quartile of the sample has eight employees and assets of 3.90 mm NOK (<$560 thousand).[5] These firms are, however, very similar in size to the majority of active corporations in the United States. For example, according to the Internal Revenue Service's Statistics of Income Data, approximately 80% of active corporations in the United States in 2009 had less than $500 thousand in assets.[6] Although the sample is predominately small firms, much larger firms are also included. The median firm among the 200 largest has 8370 mm NOK in assets (>$1 billion). Therefore, based on a firm's size as a proxy for the costs of external financing (see e.g., Hennessy and Whited (2007)), the sample features both substantial costs of external financing and substantial variation in these costs.

We start our analysis by studying the association between a firm's cash holdings and changes in its operations. We examine both the years when industry or

---

[5]An exchange rate of 7 NOK per USD is used here. During the sample period the NOK ranges from roughly 5 to 9 NOK per USD. Source: www.norges-bank.no.
[6] See: http://www.irs.gov/uac/SOI-Tax-Stats-Table-2-Returns-of-Active-Corporations.

macroeconomic conditions change substantially, which we label as shocks, as well as non-shock years. We document several findings. First, when there are negative shocks to industries, small firms with more cash do better. In particular, changes in a small firm's sales, investment, and assets as well as the probability of it surviving a negative industry shock are positively associated with its cash holdings when the shock occurs. Results are similar when we focus on a negative macroeconomic shock (the Global Financial Crisis), rather than industry specific shocks. Second, cash holdings matter less during non-negative shock years. Specifically, we find no association between a small firm's cash holdings and changes in sales when we focus on years in which positive shocks occur or years without shocks. Third, the benefits of holdings more cash are generally less for large firms than for small firms. For example, we find no evidence that cash holdings are associated with changes in a large firm's sales around a shock or with the probability of a large firm surviving a shock, regardless of the type of shock. For large firms, cash matters most for changes in investment and assets around a negative macroeconomic shock.

A concern in interpreting these findings is the potential endogeneity of a firm's performance and its cash holdings. In particular, although the association between a firm's cash holdings, size, and changes in operations around negative shocks is consistent with cash being valuable for small firms, it could be explained by a firm's quality. For example, better performing firms or firms with better investment prospects might also hold more cash. Although we cannot rule out this explanation, it is difficult to reconcile this firm quality explanation with the results for large firms or around other conditions. If the association between a firm's performance and its cash holdings can be explained by an omitted variable, the effect of this variable is such that it is only be important for small firms and only during negative shocks.

Moreover, the findings are similar when we use a firm's average cash holdings for three years leading up to the shock rather than just the cash holdings in the year prior to the shock. Therefore, it does not appear as if the results can be explained by variation in firms' ability to anticipate negative shocks.

Next, to understand why cash holdings matter, we examine financing choices around negative shocks. The analysis reveals patterns in financing that help explain the value of cash holdings. Foremost, there are differences between small firms and large firms in the use of additional credit around negative shocks. Small firms reduce liabilities when there are negative shocks, regardless of cash holdings or whether the shock is on the industry or macroeconomic level. Although this reduction might reflect a reduction in the firm's ability to take on more debt, it might also reflect a reduction in the willingness to use more debt by owners who are likely poorly diversified. There is no evidence that small firms make up for this decrease in liabilities and cash flow with an increase in equity financing. As a result, the availability of internal financing is especially valuable for small firms around negative shocks. In contrast, large firms increase the use of leverage during industry shocks. This increase is greatest for large firms with low cash holdings. Although borrowing by large firms decreases during the Global Financial Crisis when credit standards tightened, there is no evidence that this decrease resulted in a greater reduction in sales by the large firms with less cash.

In addition, for both large and small firms, the use of trade credit around negative shocks varies with cash holdings. In particular, when negative shocks occur, trade credit on net (change in accounts payable minus change in accounts receivable) increases for low cash firms and decreases for high cash firms. In other words, firms with less cash going into a negative shock increase their reliance on supplier financing

while the firms with greater cash holdings cut back their use of – or even became providers of – supplier financing. This result is similar to the evidence in Garcia-Appendini and Montoriol-Garriga (2012) for public firms around the Global Financial Crisis. Given the high costs of supplier financing discussed in Petersen and Rajan (1994), the results show that an additional benefit of additional cash holdings for private firms, both large and small, is its effect on the use of supplier financing around negative shocks.

Collectively, the results show that the value of cash holdings for private businesses varies substantially across firms and conditions. There is little evidence that firms benefit from holding more cash during normal or abnormally good operating conditions. The value of cash, however, is greatest when operating conditions turn negative, especially for small firms. The differences in the value of cash between large and small firms can at least in part be traced to financing activities around negative shocks.

Perhaps what is most surprising about these results is the importance of a firm's size. Given that the vast majority of the firms in the sample are very small (e.g., the median firm in the *largest* quartile has approximately $2 million in assets), we might expect nearly all of the firms in the sample to be constrained. We find, however, that both financing around negative industry shocks and the importance of cash around negative industry shocks differ with a firm's size. A possible explanation for a size effect within the sample is that there are few large firms in Norway, private or public. A bank or other type of investor looking to provide capital to a Norwegian firm (because of a home bias, regulatory consideration, or other factors) has very limited choices if only considering firms generally classified as large. Therefore the

investor might need to consider much smaller firms than if investing in the U.S. or other larger countries.[7]

Our paper relates to the literature on the financial policies of small and private businesses. Similar to Petersen and Rajan (1994), Petersen and Rajan (1997), and Brav (2009), we explore forms of financing for small businesses. These papers show that private firms depend primarily on debt financing and that banking relationships and financing from suppliers are especially important for small private businesses. Our findings indicate that when access to these forms of external financing is most limited, cash holdings are also a valuable form of financing. Therefore, similar to Harford, Klasa, and Maxwell (2013), our paper shows an interdependence between the risks of obtaining external financing and cash holdings. Moreover, like Vickery (2008) our findings provide insights into risk management by small businesses. Vickery shows that small firms adjust their interest rate exposure to manage the risk of changes in the availability of credit. Our study shows the importance of cash policy decisions for small firms in managing this and other types of risks.

DATA

We investigate the cash holdings of private firms using data from the Centre for Corporate Governance Research (CCGR) at BI Norwegian Business School.[8] To our knowledge, the database has the most extensive collection of financial information on private firms that exists. It includes more than 238,000 firms incorporated in Norway.

---

[7] This argument assumes that when compared to the U.S., there are few large Norwegian firms needing capital relative to the amount of available capital.
[8] Accounting, ownership, and board data are delivered by Experian (www.experian.no) and are in principle publicly available. Data on family relationships are from Skattedirektoratet (Norwegian Tax Administration). All data items have been received in electronic form and are organized as an integrated database by the Centre for Corporate Governance Research (www.bi.edu/ccgr).

It has fifteen years of accounting data, nine years of governance data, credit ratings for each firm, and extensive data on ownership.

The availability of these data arises because the Norwegian Accounting Act mandates that all limited liability firms be audited.[9] Every limited liability firm, regardless of listing status, is required to publish an annual report with an income statement, a balance sheet, accompanying notes, board of directors' report, and an auditor's report. The rules governing the structure and contents, which must be audited by a publicly certified auditor, apply to all limited liability firms. Each firm must publish the identity of its CEO, directors, and owners, as well as the fraction of equity held by each owner. If a firm fails to submit this information within seventeen months after a fiscal year end, automatic liquidation is triggered. In addition to these data, CCGR also indentifies family relationships by blood and marriage for all owners, officers, and directors.

We construct our dataset starting from the universe of all firms in Norway (145,656 firms in 2000; 238,213 firms in 2009).[10] Using this dataset, we employ the following data selection criteria: we drop financial firms, public firms, non-limited liability firms, firms in which the largest owner is the Norwegian state, firms with missing industry codes, firms in which assets differ from liabilities plus shareholders equity by more than 2000 NOK, and firms in which financing related variables are in the tails of the variable distribution (bottom and top one percent). Finally, we also discard firms if the number of employees is less than three or if it has no sales. The remaining sample consists of 50,696 firms in 2000 up to 66,817 firms in 2009. A

---

[9] For a further discussion of auditing of financial statements in Norway see Hope and Langli (2010).

[10] Some of our variables represent averages over several years and thus contain data prior to 2000. We deflate all data to 1998 Norwegian Kroner (NOK). Results, however, are virtually identical if we do not deflate the data.

detailed breakdown of the construction of the sample and the variables used in the analysis is shown in Appendix 1.

Summary Statistics

In Table 1 we sort the sample firms into quartiles by assets and report summary statistics. Average sales are 1.7 mm NOK (<$250 thousand) for the smallest quartile and 31 mm NOK (>$4.4 million) for the largest quartile. The average number of employees ranges from 5.3 for the smallest quartile to 24.9 for the largest. Average assets are 0.54 mm NOK (<$100 thousand) for the smallest quartile to 24.6 mm NOK (>$3.5 million) for the largest quartile. Therefore, these firms are generally very small when compared to publicly traded firms in the United States and even when compared to the private companies examined in some other studies: the median private firm in Gao, Harford, and Li (2012) has $228 million in assets and the average private firm in the sample in Michaely and Roberts (2012) has £86 million in assets.[11] These firms are, however, very similar to the small businesses in the United States. For example, more than 97 percent of the small businesses in the United States have less than 20 employees.[12]

Firms tend to be profitable and have positive sales growth. There is, however, substantial variation in the rate of growth and profitability within quartiles. For example, among the smallest quartile of firms, year to year sales growth is 23% on average but close to 0% for the median firm. Similarly, for the largest quartile of firms, year to year asset growth is 19% on average but only 4% for the median firm.

---

[11] Closer in size to our sample are the privately held U.S. firms in Asker, Farre-Mensa, and Ljungqvist (2012). The median private firm for the full sample of Akser et al. has $1.4 million in assets.
[12] See data in Table 1 of the SBA Office of Advocacy's Small Business Profile report: http://www.sba.gov/sites/default/files/us12.pdf . The SBA generally defines small businesses as companies with less than 500 employees.

Although both the mean and the median of return on assets is generally positive across quartiles, in untabulated analysis we find that the fraction of firms not generating positive income ranges from 44% for the smallest quartile to 23% for the largest quartile.

A noticeable difference across the quartiles is investment. The largest quartile of firms invests an average of 1.05 mm NOK and a median of 0.158 mm NOK. By comparison the second quartile only invests 0.05 mm NOK and the smallest quartile invests an average of 0.005 mm NOK. In additional untabulated analysis, we find that investment as a fraction of assets is an average of 4% for the largest two quartiles and 3% for the second quartile and close to 0% for the smallest quartile. Therefore, the greatest difference in investment is for the smallest quartile of firms.

Consistent with more constrained firms hoarding cash, cash holdings are greatest for the smallest firms. The ratio of cash to assets ranges from an average of 0.33 and a median of 0.26 for the smallest quartile to an average of 0.18 and a median of 0.10 for the largest quartile. This pattern in cash holdings is similar to that in Gao, Harford, and Li (2012) who find that among private firms in the United States, cash holdings are negatively associated with assets. It is also similar to the Internal Revenue Service's Statistics of Income Data, the ratio of cash to assets is 24% for firms with less than $500 thousand in assets and 6% for firms with more than $25 million in assets. In addition to the variation across quartiles of the sample, there is also substantial variation of cash holdings within the quartiles. The standard deviation of cash holdings is 28% for the smallest quartile and 20% for the largest quartile of firms.

The ratio of liabilities to assets is similar across quartiles. Medians for the quartiles fall between 78% and 83% and averages are between 73% and 87%.

Substantial differences, however, exist in the composition of the liabilities. Consistent with the idea that small firms face difficulties raising long term debt, the ratio of short term liabilities to total liabilities for the smallest quartile is an average of 0.83 and the median is 1. For firms in the largest quartile, the average ratio of short term liabilities to long term liabilities is 0.65 and the median is 0.73. The high leverage ratio and dependence on short term liabilities among these firms in general is consistent with Brav (2009) who argues that these choices reflect private equity being more costly than public equity and the desire of owners to maintain control.

Although the majority of firms do not pay dividends, firms that do pay dividends pay out a large fraction of income. The median dividend payout (dividends to net income) is 0%. The average dividend payout, however, is 14% for the smallest quartile of firms and between 26% and 30% for the other quartiles.

Finally, most firms are closely held. The largest shareholder owns between 62% and 68% of the firm's shares on average. The fraction of the shares owned by the CEO declines from 53% for the smallest quartile to 25% for the largest quartile. The medians decline from 50% to 0%. Institutional ownership is almost non-existent. Institutions own an average of 0.34% of the smallest quartile firms and 1.89% of the largest. State ownership is of a similar magnitude.[13]

The characteristics indicate that although all the firms are private, there are likely important differences in their access to external financing. The financing policy choices, particularly cash holdings and use of long term liabilities, are consistent with the view of Hennessy and Whited (2007) and others that smaller firms face greater difficulties in obtaining external financing than larger firms.

---

[13] As noted above, firms in which the largest owner is the State are excluded from the sample.

To examine when – or if – cash holdings are of value, we focus on how a firm performs during years when there are large changes (what we label as "shocks") to its operating environment that can have important effects on its cash flows. We examine whether a firm's performance around these shocks, as well as during non-shock years, varies with its size and cash holdings.

ANALYSIS OF FIRM PERFORMANCE AROUND SHOCKS

Industry shocks

Our primary definition of a shock to a firm's operating environment is based on changes in sales for a firm's industry. Using data from 2000 to 2008, we sort all firms into one of eight industries (using NAICS codes).[14] These industries include agriculture, manufacturing, energy, construction, service, trade, transport, and firms operating in multiple sectors. We then identify the industry-years with the largest change in sales at the aggregate level. We classify the industry-years with a year to year change in sales that is in the bottom decile of all industry years as negative shocks and industry years in the top decile as positive shocks.[15]

Summary statistics for the industry years with positive and negative shocks are shown in Table 2. The industry-years with negative shocks include three different industries from seven different years. The decline in sales in the negative shock group is at least -7.22%. The industry years with positive shocks include five different industries and five different years. The increase in sales for the positive shock group is 25% or more. Several of the industries that realized a positive shock

---

[14] Data from 2009 are used in the analysis of macroeconomic shocks.

[15] We have 72 industry-years. Therefore, we are not able to cut the sample into exactly the top and bottom decile. The cutoffs we use are the top and bottom 11% of the sample, i.e., eight industry years. The cutoff at eight industry-years (versus seven) is also at the point in which there are clearer differences in industry performance. For example, in the seventh and eighth worst industry-years, the decline in sales from the prior year is -7.65% and -7.22%. In the ninth worst industry-year, which we do not count as a negative shock, the decline in sales is only -4.35%.

have substantially more firms than industries that realize a decrease; therefore the number of firms we examine around positive shocks is greater than the firms around negative shocks.[16]

To examine the importance of these shocks at the firm level rather than at the industry level we estimate regressions using a framework similar to Gertler and Gilchrist (1994). Gertler and Gilchrist (1994) examine the differences in performance between large and small manufacturing firms around changes in monetary policy rather than in industry conditions. The regressions we estimate are panel regressions using the entire sample from 2000 to 2008. The dependent variables include changes in sales, inventory, and short term liabilities. A dummy variable that is set to one in any year in which a firm's industry realized a shock and zero otherwise is included as an explanatory variable in the regressions. Like Gertler and Gilchrist, we estimate regressions for small and large firms separately. For brevity in presenting the results, we classify firms in the two smallest quartiles as small firms and the firms in the two largest quartiles as large firms. Results are similar if we break the firms in quartiles.

The results from these regressions are shown in Table 3. The dependent variable used in each regression is shown in the first column and the coefficient on the dummy variable indicating a shock is shown in the next two columns. The regressions indicate that the events we identify as shocks do not simply reflect changes for just a handful of the most dominant firms in the industry and are not just artifacts of the data (i.e., a result of firms leaving the sample or new firms entering the sample). In particular, both large and small firms realize a significant change in sales

---

[16] There are also year to year differences in the number of firms in the industries. We can determine entry and exit of firms operating in an industry. However, we cannot determine the reason for other differences: they might reflect changes in the collection methodology by the data provider, or some other aspect of the data. Because these differences are particularly notable for the multi-sector industry, we re-estimate the analysis without this industry. The findings from the analysis that excludes multi-sector are qualitatively similar to those presented here.

around these shocks. For example, when we use the change in the ratio of sales to assets as a dependent variable, the coefficient for the year of the negative industry shock is -0.11 for small firms and -0.08 for large firms. For the dummy variable indicating a positive industry shock, the coefficient is 0.17 for small firms and 0.12 for large firms. All of these coefficients are statistically significant showing that these are events that ripple throughout the firms in the industry.

The regressions also provide a comparison to the findings of Gertler and Gilchrist (1994). Gertler and Gilchrist examine changes in sales, inventory, and debt around changes in monetary policy. They find that, in general, small firms lose ground to large firms when the availability of credit tightens and do not make up this ground when credit loosens. Gertler and Gilchrist interpret the findings as evidence of small firms facing liquidity constraints. Similar to Gertler and Gilchrist, we find a significant reduction in inventory around negative shocks for small firms but not for large firms and no significant increases in inventory for small firms around positive shocks.[17] These findings are generally consistent with the idea that the effect of shocks can vary with a firm's size. Our interest turns to the importance of cash holdings in managing the effects of these shocks.

Cash holdings, firm performance, and industry shocks

In Table 4 we estimate ordinary least square regressions for the industry-years with negative shocks and the industry-years with positive shocks. The dependent variable in these regressions is the change in sales scaled by assets. By construction,

---

[17] Analysis of changes in sales and short term debt provides a less direct comparison to Gertler and Gilchrist (1994) for a couple of reasons. First, the change in sales around shocks in our sample largely reflects the way a shock is defined. Second, because the use of short term debt is increasing during the sample period, a negative coefficient on the change in short term debt during shock years can reflect a decrease in short term debt or an increase in short term debt just at a slower rate than non-shock years. In analysis we discuss below, we separately examine the cross sectional variation in the change in sales and short term debt around these shocks.

all firms in our sample have sales. Only about 70%, however, have positive profits. As explanatory variables we include variables to control for cash holdings and wide range of other firm level operating characteristics that are described in the table. In addition to these control variables, we include industry and year dummy variables and cluster errors at the firm level.

Of primary interest for our analysis is the coefficient on cash holdings from these regressions. The regressions in Table 4a are estimated using the entire sample of firms around positive and negative shocks. The coefficients on cash holdings in these regressions are statistically insignificant. These findings indicate that, in general, more cash does not lead to better performance during shocks.

Next, based on arguments that a firm's access to the capital markets can vary with its size, we further sort the sample into small and large firms. The results from these regressions are shown in Table 4b.[18]

The regressions in Table 4b show differences in the importance of cash holdings between small and large firms and between positive and negative shocks. Among small firms, the level of cash holdings is positively associated with the change in sales around negative shocks. Based on the coefficient on this variable of 0.33, a one standard deviation increase in cash holdings is associated with an increase in sales for small firms around negative shocks of 6.3%. This increase is roughly two times the change in sales for the average small firm around negative shocks. This finding indicates that the small firms that had greater cash holdings going into a negative shock did better than small firms with less cash. The coefficients on cash holdings in

---

[18] In addition to the analysis shown here, we consider various robustness checks. For example, in untabulated analysis, we repeat these regressions but sort the firms into quartiles instead of into small and large. The results from these regression specifications are consistent with the analysis shown here. Further, our results are essentially unchanged when we sort by all firms that pass our filters instead of sorting by only firms that realize shocks.

the other regressions are not significant. The findings show that the benefits to small firms from additional cash holdings, at least in terms of changes in sales, are only apparent around negative shocks. For large firms, the benefits from additional cash holdings are less clear. The coefficient on cash holdings is not significant during positive or negative shocks.

The findings do not appear to simply reflect faster growing firms holding more cash. For example, the regressions include average sales growth for past years as a control variable.[19] Moreover, in the last two columns of Table 4b, we estimate additional regressions on the change in sales for years when shocks do not occur. The idea for these regressions is that if a firm's cash holding is just a proxy for its sales growth in general, there should be a positive correlation between cash holdings and sales growth in non-shock years as well. There is no evidence in these last two columns that cash holdings are associated with sales growth when no shock occurs. The regressions include both industry and time fixed effects, so it also does not appear that these findings reflect unobserved characteristics of industries or time.

Findings are similar when we follow an approach similar to Duchin et al (2009) and use the average of the past three years of cash holdings rather than just the year prior to the shock. These results, shown in Table 4c, indicate that the association between cash holdings and change in sales around negative shocks does not appear to be explained by differences in firms' ability to anticipate a shock. A difference in these results from the earlier findings is that when all observations are pooled, average cash holdings are positive regardless of the firm size. These findings, shown in the

---

[19] The results shown for regressions on changes in sales (Table 4a, 4b, 5, and 9) also include the sales growth for the past year t-1. Results are similar if we exclude the sales growth for year t-1 from these specifications. In addition, a lagged measure for high hedging needs (HHN) is included in these regressions to control for sales growth fuelled by recently executed growth options that required large cash positions. Results for the association between cash holdings and firm performance in negative shock industry-years are similar if regressions are estimated with contemporaneous HHN rather than lagged HHN.

last two columns of table 4c, indicate that although prior year cash holdings are generally not associated with the change in sales, firms with higher cash holdings on average realize a greater increase in sales.

In Table 4d, we take a slightly different approach by pooling the sample and estimating an ordinary least squares regression. Like the earlier regressions, the dependent variable is the change in sales to assets. Included in this regression are the dummy variables *Negative Shock*, *Small Firm*, and *High Cash*, along with the control variables from the earlier regressions. *Negative Shock* equals one in years in which the firm's industry realized a negative shock and zero otherwise. *Small Firms* equals one if the firm's assets are less than the median and zero otherwise. *High Cash Holdings* is set to one if the firm's ratio of cash to assets is in the top quartile and zero otherwise. These dummy variables are also interacted.

Of primary interest in this difference-in-difference-in-difference specification is the triple interaction term of Negative Shock, Small Firm, and High Cash. The coefficient on this term in Table 4d is 0.152 and is statistically significant. This result indicates that the change in sales to assets around negative shocks for small firms net the change for large firms is greater for the small firms with the greatest amount of cash. These findings are consistent with the results in Table 4b and support the idea that the benefits of cash are greatest for small firms around negative shocks.

One explanation for the positive association between cash holdings and performance for small firms around negative shocks is that cash holdings provide a hedge against downturns in cash flow. An alternative is that there is an endogenous association between cash holdings and performance. Companies with better investment opportunities might choose to hold more cash or there might be some other variable omitted from the analysis that explains the findings. Although there

does not seem to be a way -- at least we are not aware of a way -- to fully address concerns of endogeneity in this setting, the results help mitigate these concerns. In particular, there is no association between cash holdings and performance for small firms when there is no shock or when there is a positive shock. There is also no evidence of an association between cash holdings and performance for large firms around any condition. If the association between cash holdings and performance is endogenous, it is not clear why this association is apparent when small firms realize negative shocks but not for larger firms or around other shocks.

Overall, the findings in Table 4b, 4c, and 4d are consistent with benefits to small firms from additional cash holdings. The findings, however, also show that more cash is not always better. In particular, small firms benefit from holding more cash only when there is a negative shock. Large firms do not appear to benefit from holding more cash around industry shocks, at least in terms of changes of sales. The results indicate that although holding cash can be a valuable hedge, who benefits and when they do so can be limited.

Macroeconomic shocks

To further investigate the importance of cash holdings we focus on company performance around the Global Financial Crisis. Although this crisis became widespread in 2008, much of the effect on the industries in Norway was felt in 2009. For example, the median industry in 2009 realized a decrease in sales of 12.02%. By comparison, in the second worst year in Norway during our sample period (1999), the decrease in sales for the median industry was 1.41%. Also around this time, the availability of credit across the economy tightened substantially. For example, the Norges Bank's Survey of Bank Lending indicates a trend of tightening credit

standards from 2007 until the third quarter of 2009.[20]   Therefore, this event was not only a large shock to firm's internal cash flows, but also occurred when access to external financing was especially limited.

We conduct our analysis using the firms that existed at the end of 2009 and sort the sample firms by size.[21]   We then estimate regressions on the change in sales in 2009 using the control variables from Table 4.   These regressions are shown in Table 5a.   The regressions in Table 5b are identical except the average of cash holdings for the three years leading up to shock is included in the regression rather than just cash holding prior to the shock.

The results in Table 5a and Table 5b are similar to those in Tables 4b, 4c, and 4d.   During 2009, the coefficient on the cash holdings variable is significantly positive for small firms but not for large.   This finding shows that, among the small companies, the ones with more cash did better through the Global Financial Crisis.   In Table 5a, the coefficient on this variable is 0.20.   To put this value into perspective, a one standard deviation increase in cash holdings is associated with a change in sales around a negative macroeconomic shock that is 4.5 percentage points better than the change in sales for the average small firm.   For larger firms, performance around this crisis does not vary with cash holdings.   The results indicate that there are benefits of cash holdings for small firms around downturns at the macroeconomic level as well as at the industry level.   The benefits of additional cash holdings for larger firms around these events are less clear.

---

[20]   See   http://www.norges-bank.no/en/about/published/publications/norges-banks-survey-of-bank-lending/.   For further discussion about the effects of the global financial crisis on Norway also see: http://www.imf.org/external/np/sec/pn/2010/pn1014.htm.
[21] Later in the analysis, we examine the survivorship of firms through a shock.

Changes in operations around shocks

Although the data limit our ability to pinpoint the ways that cash is used to help sales (e.g., we do not observe changes in advertising expenditures or maintenance), we can observe other changes in firms' operating activities. To study the importance of cash for other activities, we examine changes in inventory, employees, investment, dividends, and assets.

We start by sorting the sample by size and examine changes around shocks for small and large firms. The findings indicate that around negative industry shocks small firms generally make larger cuts to operations than large firms. For example, as shown in the first two columns of Panel A in Table 6, the median small firm reduces its inventory by 2.4%, its assets by 3.9%, and its investments by 79.5%. By comparison, the median large firm increases assets by 1.3%, increases inventory by 3.6%, and decreases its investments by 67%. Results are similar in Panel B, when we examine the macroeconomic shock. Again we find a larger decrease in inventory, assets, and investment for small firms than large.

Next, to examine the importance of cash holdings for these changes, we further sort the sample by cash holdings. Columns 4 to 9 of Table 6, indicate that cash holdings are important in several ways. For example, around the negative industry shocks shown in Panel A, the greatest reduction in investment and in assets is for the firms with the least amount of cash. Low cash small firms reduce investment by 83% and reduce assets by 5% while small firms with high cash reduce investment by 75% and assets by 2.5%. For large firms, the primary difference is that the reduction in investment by low cash firms of 73% is significantly greater than the reduction in investment by high cash firms of 57%.

The importance of cash holdings becomes more apparent in Panel B when we examine changes around the Global Financial Crisis. For small firms, the reduction in inventory and assets is greater for firms with low cash holdings. Although there are

large cuts in investment regardless of cash holdings, the cuts are slightly greater for firms with high cash. For large firms, there are clear differences in the changes in operations between high cash and low cash firms. Inventory, investment, and assets are all reduced by a greater extent by the large firms with low cash holdings. Therefore, although we do not find that cash holdings are associated with changes in the sales for large firms, there is some evidence that cash holdings can be important for other aspects of a large firm's operations.

A comparison of Panel A to Panel B shows that the benefits of cash vary with the type of shock. A potential reason for this variation is that the effect of a shock on capital market conditions can depend on the shock. For example, industry specific shocks likely have little effect on bank lending or the availability of other forms external financing. Therefore, a company facing a decrease in internal financing because of an industry shock can increase its use of external financing and lose little ground to counterparts with more cash. Macroeconomic shocks, however, can have a much larger effect on the availability of external financing. (See for example, the Norges Bank's Survey discussed earlier.) When negative macroeconomic shocks occur, offsetting a decrease in internal financing with external financing becomes more difficult and firms with low cash holdings are at a greater disadvantage. The findings indicate that the benefits large firms realize from cash holdings can vary with the conditions of the lending market.

ANALYSIS OF CASH HOLDINGS AND FINANCING

The findings show that the benefits of cash holdings vary with a firm's size and the operating conditions it faces. To further understand these results we examine questions that focus on the financing decisions leading up to and at the time of the shock.

Why are there differences in cash holdings?

The variation in the benefits from cash holdings raises questions regarding the reasons for the variation in cash holdings. To better understand why some firms hold more cash than others, we analyze the cross sectional variation in cash holdings. Of interest is the extent to which the differences in cash holdings reflect differences in historical operating performance and prior external financing activities.

To examine a firm's sources of cash we follow an approach similar to Kim and Weisbach (2008), Hertzel and Li (2010), and McLean (2011) and regress the firm's cash holdings at the beginning of the shock year (t-1) on potential sources of the cash. The explanatory variables in the analysis include the firm's operating cash flow, dividend payout, debt issues, equity issues, and historical cash holdings. We sort the sample into large and small firms and also by high and low cash. The findings are shown in Table 7. Regressions in Panel A are estimated using the past four years of data. The regressions in Panel B use the average value of these variables for the past four years.

The sources of cash are similar between large and small firms. Internal financing is an important determinant of cash holdings for both groups. In particular, the variation in cash is associated with the current year's operating cash flow. For large firms, the operating cash flow in prior years (i.e., year t-2 and year t-3) are also statistically significant, although not for small firms. When we examine the variation in cash holdings using the average values from prior years, operating cash flow is only statistically significant for larger firms. Stronger results are found for the firm's choice of a payout policy, measured using (OPCF-DIV)/OPCF. Firms that, on average, retained a larger fraction of their operating cash have more cash at the time of the shock. This is true for both small and large firms. Moreover, unlike operating cash flow, the variables for payout policy in prior years are significant for small firms.

Therefore, the variation in cash holdings is not just a function of which firms generated cash but also the extent to which they retained the cash.

There is little evidence that the variation in cash holdings arises from differences in external financing. For both small and large firms, there is no consistent association between changes in liabilities or equity and cash holdings. For the few cases in which change in liabilities is significant, the coefficient is negative indicating that firms with more borrowing did not result in greater cash holdings.

The strongest results are for historical cash holdings. For both large and small firms, cash holdings at the time of the shock (t-1) are positively associated with cash holdings three years prior to the shock (t-4). This persistence in cash holdings is similar to that documented for public firms in Dittmar and Duchin (2010) and for private firms in Gao, Harford, and Li (2012) and consistent with a firm choosing a cash holdings policy rather than cash building up randomly.

The results indicate that cash holdings largely reflect corporate cash management policies. Firms with greater cash holdings have retained a larger fraction of the cash from operations and have historically kept high levels of cash. These findings hold for large and small firms. The results are consistent with cash being held for precautionary reasons, rather than just being a residual effect of greater profitability.

How do firms finance themselves when shocks occur?

We next examine the variation in firms' use of external financing around negative shocks. This analysis is motivated by the findings in Tables 4 and 5 that the availability of internal capital, in the form of cash, at the time of a shock is associated with the performance of small firms but not large. Therefore, of particular interest are the differences in how small and large firms finance themselves around these events.

We examine this issue by sorting firms by size and cash holdings and then examining the use of various forms of external financing in the year of the shock. Results from this analysis are shown in Table 8.

Industry Shocks

In Panel A of Table 8 we examine changes around negative industry shocks and scale these changes by assets in the year prior to the shock. The findings show a clear difference in the use of liabilities around shocks between large and small firms. The fraction of liabilities to assets increases by 1.46% for the median large and decreases by 2.15% for the median small firm. In other words, large firms respond to negative industry shocks by borrowing more while small firms borrow less.

Differences in the use of leverage become more apparent when we further sort the sample by cash holdings. Consistent with firms borrowing to make up for a shortage of internal financing (cash), we find that large firms with less cash increase liabilities to assets by 2.02%. Large firms with more cash only increase liabilities to assets by 0.41%. There is no evidence, however, of low cash small firms borrowing more than high cash small firms around shocks. In fact, low cash small firms reduce liabilities by more than high cash small firms (-2.56% versus -1.58%). There is also no evidence that small firms with low cash holdings, or small firms in general, make up for this reduction in liabilities by increasing equity financing.

An examination of changes to the maturity structure of the liabilities shows a shift from long term liabilities to short term liabilities.[22] The extent of this shift helps

---

[22] The change in short term liabilities shown here includes accounts payable. Results are similar if we exclude accounts payable from the calculation of short term debt. We also examine changes in accounts payable separately in this table.

explain the differences in borrowing between large and small firms. For example, among large firms, the ratio of short term liabilities to assets increases by 2.55% for low cash and by 1.19% for high cash. Long term liabilities, however, decrease by 1.72% for low cash and by 0.43% for high cash. For small firms, long term liabilities decrease by 2.60% for low cash and by 0.04% for high cash.[23] Although small firms increase their use of short term liabilities, they do so to a much lesser extent than large firms. In addition, there is no significant difference in this increase between high cash and low cash small firms. Therefore, the increase in liabilities for large firms, especially low cash large firms, and decrease for small firms is mostly due to differences in the use of short term liabilities.

For both large and small firms there is an association between cash holdings and the use of trade credit around negative shocks. We measure changes in trade credit (also referred to as supplier financing) as the net change in a firm's accounts payables minus its accounts receivables. We scale this net change by assets. A positive change indicates that a firm is increasing its net use of trade credit (i.e., using more trade credit than it is granting) while a negative change indicates a decrease in the use of trade credit. There is a slight decrease in the use of trade credit for large firms but not small. What stands out, however, is the difference between high cash and low cash firms. Small firms with low cash increase their use of trade credit by 0.08% while small firms with high cash reduce their reliance on trade credit by 0.14%. Similarly, large firms with low cash increase trade credit by 0.13% while large firms with high cash reduce trade credit by 0.36%. As discussed in Peterson and Rajan (1997) and Petersen and Rajan (1994), trade credit is arguably the most

---

[23] In additional untabulated analysis there is some evidence that one of the sources of the decrease in long term liabilities is a decrease in liabilities to financial institutions, although in general these changes seem to be spread across various sources of long term financing.

important source of short term finance and among the most expensive forms of credit. To the extent that an increase in trade credit financing reflects firms stretching out their payables because they cannot obtain other forms of financing, a shortage of cash can be especially costly. At the same time, if holding more cash enables firms to provide more trade credit, additional cash holdings can be beneficial, see for example Garcia-Appendini and Montoriol-Garriga (2012).

In the final row of Panel A, we examine the changes in cash holdings. Of primary interest is the extent to which firms use internal capital to fund operations during shocks. The findings show that for high cash firms, cash is an important source of financing. Cash decreases by 2.45% for large high cash firms and by 3.31% for small high cash firms. There is little evidence that low cash firms use cash to fund operations during shocks. In fact, low cash firms slightly increase cash holdings. This increase in cash holdings is 0.03% for large low cash firms and 0.42% for small low cash firms. The findings indicate that firms with greater cash holdings manage negative shocks using cash while low cash firms use external financing or cut back on operations. The results can be compared to Daniel, Denis, and Naveen (2010) who examine how firms react to cash shortfalls. They find that firms realizing cash shortfalls issue debt rather than using cash holdings. Although we find similar results for the large low cash firms in our sample, there is also evidence that high cash firms – both large and small – reduce cash holdings around negative shocks.

Overall, the findings in Panel A support the idea that large firms have a greater ability to access the external capital market when internal funding falls short. It is difficult to know whether to interpret the lack of borrowing by small firms, especially small low cash firms, as a supply or demand effect. One explanation is that when negative shocks occur, small firms have very limited access to credit, other than trade

credit. This supply of credit explanation is consistent with survey evidence indicating that the constraints around a shock vary with firm size. For example, in the March 2009 Duke / CFO Magazine survey, only 27% of firms with less than $25 million reported that they had the ability to obtain external funding to finance attractive investment projects compared to roughly 54% of the firms with more than $25 million in sales.[24] An alternative is a demand for credit explanation. Owners, who are likely often poorly diversified, are not willing to take on additional credit around these events (other than stretching out payables) because their concerns have shifted from growth to survival.[25] In either case, the availability of internal financing can be especially valuable.

Macroeconomic Shocks

In Panel B of Table 8 we focus on changes in financing around Global Financial Crisis. Although the results for small firms are similar to the results using industry shocks, results differ substantially for large firms. The biggest difference between this macroeconomic shock and industry shocks is in the use of leverage. For the median large firm, the fraction of liabilities to assets decreases by 2.55%. Moreover, the 2.95% reduction in liabilities for large low cash firms exceeds the 1.80% reduction for the large high cash firms. Therefore, unlike the results for the industry shocks, large firms with low amounts of cash are not making up for cash shortfalls by borrowing more. There is also no evidence that the large firms with low

---

[24] See question 12b of the March 2009 US survey http://www.cfosurvey.org. In another question of this survey (12a), companies are asked about financing during normal market conditions. Sixty-six percent of the firms with less than $25 million reported the ability to obtain external funding to finance investment projects compared to eighty-five percent of firms with more than $25 million.
[25] For a discussion of the concerns of small businesses following the most recent financial crisis and recession see "Small Firms Hunger for Sales, Not Credit," The Wall Street Journal, August 5 2011.

cash holdings increase their equity, increase their use of supplier financing, or use their existing cash holdings to fund operations.[26] These results are consistent with evidence in Table 6 that the differences in operating performance between high cash large firms and low cash large firms are greater around macroeconomic shocks than industry shocks. The findings suggest that the type of shock can be important for the value of cash holdings. In particular, for larger firms, cash holdings can be more valuable around shocks that also affect the availability of external financing.

Overall, the results show the benefits from cash holdings when a firm realizes a negative shock and is not able to – or not willing to – use external financing to offset the shock. These finding are consistent with the argument in Harford et al (2013) that the risks of refinancing can explain why firms with more short term debt hold more cash.

ALTERNATIVE MEASURES

Measuring performance using a firm's survival

We consider alternative measures of firms' performance around a shock. First, we examine whether a firm survives a negative shock. A benefit of focusing on a firm's survival is that survival is probably the performance measure that its owners care about most.

---

[26] By comparison, Hunter (1982) examines all corporations during the Great Depression of the 1930's and documents that there were substantial differences in changes in cash holdings between large and small firms in the United States. In particular, very large firms (corporations in the top 1% of total assets) increased holdings of liquid assets, while smaller firms decreased holdings. Hunter attributes this reduction in cash for small firms to a reduction in the supply of bank credit caused by changes in monetary policy around the Great Depression.

To conduct this analysis we classify firms that remain in the sample from the beginning of a year to the beginning of the next year as a survivor for the year. Non-survivors are the firms that leave the sample during the year. We then estimate logistical regressions in which the dependent variable is set to 0 if the firm survives and 1 if not. Regressions are estimated for the year of the shock (year t) and each year around the shock (i.e., year t-1 and year t+1). Otherwise, the regression specifications are identical to the regressions in Table 4. Results are in Table 9. Panel A includes all firms that exit the sample. Panel B excludes firms that exit because of a merger, which might actually be a positive outcome for owners. Of greatest interest for our analysis, is the coefficient on the cash holdings variable.

In both panels, the coefficient on the cash holdings variable is significantly negative for small firms for years t and t+1 relative to a shock. In other words, small firms with more cash are more likely to survive through the year of or the year after a shock. To put these values in perspective, in untabulated analysis we compute the probability of survival around a shock for the firms with cash holdings in the top quartile (high cash) and the firms in lowest quartile (low cash).[27] We find that the probability of surviving a negative shock is eighty-nine percent for small firms with high cash holdings compared to eighty-one percent for small firms with low cash holdings. For large firms there is little difference in survival probability between high cash and low cash firms.

The findings show that – like the results for change in sales – the benefits of cash holdings for a firm's survivorship are most apparent for small firms when a negative shock occurs. For a larger firm, holding more cash does not appear to improve its ability to survive a shock.

---

[27] These probabilities are the average marginal effects estimated using Stata's Margins command. Findings are similar when we estimate marginal effects with other variables set at average values.

Measuring performance using change in market share

As an additional measure of performance around shocks we take an approach similar to Fresard (2010) and examine changes in market share. We define a firm's market share as its sales divided by total sales for all firms in its industry. We compute this measure in years before and after the shock. The change in market share is the difference in this measure between years (market share post-shock minus market share pre-shock). The pre-shock is year (t-1). The post-shock is measured through end of the shock year (t), end of the year after the shock (t+1), and through end of two years after the shock (t+2). The magnitude of the change in market share is generally very small. For example, the median percentage point change in market share is 0.002 for small firms and 0.013 for large firms (untabulated). To better understand the importance of cash for the change in market share, we estimate regressions. The regressions are similar to the regressions in Table 9 except the dependent variable is the change in a firm's market share around a shock, rather than a variable indicating whether a firm survived a shock.

The results shown in Table 10 provide some evidence that small firms with higher cash holdings realize larger increases in market share around negative shocks than firms with less cash. In the regressions estimated on small firms, the coefficient on the cash holdings variable is positive, although only statistically significant (at the 10% level) through the end of the shock year. For regressions estimated using the sample of larger firms, the coefficient on cash holdings is negative and statistically significant through both year one and year two after the shock. Therefore, there is no evidence that additional cash holdings enable larger firms to gain market share during negative shocks. Overall, the results from this analysis indicate that findings are similar regardless of how performance is measured.

CONCLUSION

Our analysis shows the importance of cash policy decisions for small private firms. In particular, among firms with relatively few assets, those holding more cash realize greater improvements in sales around negative industry shocks. Small firms with more cash also make smaller reductions in investment and assets and are more likely to survive negative shocks than small firms with less cash. Results are similar when we investigate negative macroeconomic shocks. There is little evidence that small firms with more cash perform better during other conditions. The findings indicate that the value of cash for small firms is largely from precautionary benefits.

For large private firms, the benefits of holding more cash are less clear. There is no evidence that a large firm's cash holdings are associated with changes in its sales around a negative shock or with the probability of it surviving a negative shock. At least in part, these results are because large firms adjust to negative shocks by increasing their use of credit financing. Consistent with this explanation, we find that the benefits of cash holdings that do exist for large firms are greatest around macroeconomic shocks that can reduce the availability of credit.

One area that cash seems to matter for both large and small firms is for the use of trade credit around negative shocks. We find that cash holdings are negatively associated with changes in a private firm's dependence on supplier financing around a negative shock, regardless of the firm's size or the type of shock. The results highlight the role of cash in helping improve a firm's standing in the trade credit market.

In summary, the benefits of cash holdings for private businesses are often not apparent. Therefore, among the many decisions made by owners of small private businesses, the choice of a cash policy might easily be overlooked. Nonetheless, when a negative shock occurs, cash holdings can be decisive for both a firm's operating performance and its probability of survival.

REFERENCES

Acharya, Viral V., Heitor Almeida, and Murillo Campello, 2007. "Is Cash Negative Debt? A Hedging Perspective on Corporate Financial Policies," Journal of Financial Intermediation 16, 515-554.

Almeida, Heitor, Murillo Campello, and Michael Weisbach, 2004. "The Cash Flow Sensitivity of Cash," Journal of Finance 59, 1777-1804.

Asker, John, Joan Farre-Mensa, and Alexander Ljungqvist, 2012, "Comparing the Investment of Behavior of Public and Private Firms," Working Paper, New York University.

Bates, Thomas, Kathleen Kahle, and Rene Stulz, 2009, "Why do U.S. Firms Hold So Much More Cash than They Used To?" Journal of Finance 64, 1985-2021.

Brav, Omer, 2009, "Access to Capital, Capital Structure, and the Funding of the Firm," Journal of Finance 64, 263-308.

Daniel, Naveen, Denis, David, and Lalitha Naveen, 2010, "Sources of Financial Flexibility: Evidence from Cash Shortfalls," Working Paper, University of Pittsburgh.

Denis, David and Valeriy Sibilkov, 2010, "Financial Constraints, Investment, and the Value of Cash Holdings," Review of Financial Studies 23, 247-269.

Dittmar, Amy and Ran Duchin, 2010, "The Dynamics of Cash," Working Paper, University of Michgan.

Dittmar, Amy and Jan Mahrt-Smith, 2007, "Corporate Governance and the Value of Cash Holdings," Journal of Financial Economics 83, 599-634.

Duchin, Ran, Ozbas, Oguzhan, and Berk Sensoy, 2010, "Costly External Finance, Corporate Investment, and Subprime Mortgage Credit Crisis," Journal of Financial Economics 97, 418-435.

Faulkender, Michael and Rong Wang, 2006, "Corporate Financial Policy and the Value of Cash," Journal of Finance 61, 1957-1990.

Fresard, Laurent, 2010, "Financial Strength and Product Market Behavior: The Real Effects of Corporate Cash Holdings," Journal of Finance 65, 1097-1122.

Garcia-Appendini, Emilia and Judit Montoriol-Garriga, 2012, "Firms as Liquidity Providers: Evidence from the 2007-2008 Financial Crisis," Journal of Financial Economics, forthcoming.

Gertler, Mark and Simon Gilchrist, 1994, "Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms," The Quarterly Journal of Economics 109, 309-340.

Gao, Huasheng, Jarrad Harford, and Kai Li, 2012, "Determinants of Corporate Cash Policy: Insights from Private Firms," Journal of Financial Economics, forthcoming.

Harford, Jarrad, 1999, "Corporate Cash Reserves and Acquisitions," Journal of Finance 54, 1969-1997.

Harford, Jarrad, Sandy Klasa, and William Maxwell, 2013, "Refinancing Risk and Cash Holdings," Journal of Finance, *forthcoming*.

Harford, Jarrad, Sattar Mansi, and William Maxwell, 2008, "Corporate Governance and Firm Cash Holdings in the U.S.," Journal of Financial Economics 87, 535-555.

Harford, Jarrad, Mikkelson, Wayne and Megan Partch, 2003, "The Effect of Cash Reserves on Corporate Investment and Performance in Industry Downturns," Working Paper, University of Washington.

Hennessy, Christopher A. and Toni M. Whited, 2007. "How Costly Is External Financing? Evidence from a Structural Estimation," Journal of Finance 62, 1705-1745.

Hertzel, Michael and Zhi Li, 2010, "Behavioral and Rational Explanations of Stock Price Performance around SEOs: Evidence from a Decomposition of Market-to-Book Ratios," Journal of Financial and Quantitative Analysis 45, 935-958.

Hope, Ole-Kristian and John Langli, 2010, "Auditor Independence in a Private Firm and Low Litigation Risk Setting," The Accounting Review 85, 573-605.

Hunter, Helen, 1982, "The Role of Business Liquidity During the Great Depression and Afterwards: Differences between Large and Small Firms," The Journal of Economic History 42, 883 – 902.

Kim, Woojin and Michael Weisbach. 2008, "Motivations for Public Equity Offers: An International Perspective." Journal of Financial Economics, 87, 281–307.

Michaely, Roni and Michael Roberts, 2012, "Corporate Dividend Policies: Lessons from Private Firms." Review of Financial Studies, 25, 711 – 746.

McLean, David, 2011. "Share Issuance and Cash Savings," Journal of Financial Economics 99, 693-715.

Nikolov, Boris and Toni Whited, 2010, "Agency Conflicts and Cash: Estimates from a Structural Model," Working Paper, University of Rochester.

Opler, Tim, Lee Pinkowitz, Rene Stulz, and Rohan Williamson, 1999, "The Determinants and Implications of Corporate Cash Holdings," Journal of Financial Economics 52, 3-46.

Petersen, Mitchell and Raghuram G. Rajan, 1994, "The Benefits of Lending Relationships: Evidence from Small Business Data," Journal of Finance 49, 3-37.

Petersen, Mitchell and Raghuram G. Rajan, 1997, "Trade Credit: Theories and Evidence," Review of Financial Studies 10, 661-91.

Vickery, James 2008. "How and Why Do Small Firms Manage Interest Rate Risk?," Journal of Financial Economics 87, 446-470.

Appendix

Sample Construction

This table shows the construction of the initial sample for our analysis. The full sample is all firms in the Centre for Corporate Governance Research (CCGR) database.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Full sample	145656	149468	153912	155996	158259	182689	208971	222196	233955	238213
Drop if variable is the tails of distribution *	22614	28507	31734	31309	31426	30373	33001	35206	39752	41601
Drop if the largest owner is state	957	1048	1059	1081	1075	1067	1066	1094	1090	1071
Drop financial firms & missing-indutry-code firms	4346	5135	4923	3723	4168	9926	22797	23301	25671	15513
Drop extreme unbalanced obs.**	420	450	380	1260	759	5593	298	253	370	263
Drop if number of employees < 3	37065	36385	37069	38243	37995	40571	41064	41833	40898	38694
Drop if zero sales	28035	26772	27222	27527	29202	34286	44698	50514	53053	68008
Sample after all filters	52219	51171	51525	52853	53634	60873	66047	69995	73121	73063
Drop if listed on Oslo Børs or Oslo Axess	19	17	18	18	20	15	21	15	13	14
Sample after dropping listed firms	52200	51154	51507	52835	53614	60858	66026	69980	73108	73049
Drop non-limited liability firms	1504	1387	2065	2187	2248	3713	4316	4804	6212	6232
Sample after dropping non-limited liability firms	50696	49767	49442	50648	51366	57145	61710	65176	66896	66817

* Tails are top and bottom 1%. Done to minimize the effect of extreme observations that likely contain errors.

** Balance sheet is classified as unbalanced if the absolute value of the difference between assets and liabilities plus shareholder equity exceeds 2000NOK.

Appendix. Continued

Definition of Variables

This table shows the construction of the main variables. The cash holdings variable is defined as cash and other liquid securities, similar to Acharya et al. (2007). The other variables are constructed by the Centre for Corporate Governance Research (CCGR). Definitions of control variables are provided in the tables.

Cash holding =	Investments in listed companies + Investments in listed bonds + Investment in other traded financial instruments + Other financial instruments + Cash and cash equivalents + Other current assets
Investment =	Change in R&D + change of Total fixed assets (tangible) - Depreciation – Impairment and write-down of fixed assets and intangible assets
Sales =	Revenue (other operating revenue is not included)
Short term liabilities =	Convertible loans + Certificate loans w/ less than 1 yr maturity + Liabilities to financial institutions + Accounts payable + Tax payable + Public duties payable + Dividends + Debts to companies in same group + Bank overdraft + Other short term liabilities
Long term liabilities =	Pension liabilities + Deferred tax + Other provisions + Provisions + Convertible Bonds + Bonds + Liabilities to financial institutions + Subordinated loan capital + Long term liabilities groups + Other long-term liabilities
Total liabilities =	Short term liabilities + Long term liabilities
Net income =	Income after tax and after extraordinary revenue and expenses

Table 1: Descriptive Statistics

This table reports descriptive statistics (mean, median, standard deviation) of sample firms (all private firms from Norway that pass our filters). Firms are sorted on size (assets) into quartiles with 1=smallest and 4=largest quartile. Firm characteristics are grouped into the following categories: firm size; growth, profits, investment & age; financing; owners and others. The sample ranges from 2000 to 2009; variables based on changes include data from 1999. Values are in NOK.

	Size			
	1=smallest	2	3	4=largest
SIZE				
Sales	1663133	4572940	9471331	30966813
	1346543	3749783	7718085	21431703
	1884397	4162286	8348098	30355152
Assets	538856	1696327	4100586	24601072
	541042	1654734	3895784	13623124
	278764	435611	1133242	32968575
# of Employees	5.272	6.753	9.888	24.874
	4	5	8	16
	4.894	6.829	9.662	38.093
GROWTH, PROFITS, INVESTMENT & AGE				
Sales Growth	0.230	0.193	0.179	0.189
	-0.001	0.026	0.036	0.042
	1.174	0.897	0.831	0.853
Asset Growth	0.091	0.136	0.165	0.195
	-0.055	0.011	0.034	0.046
	0.853	0.691	0.674	0.720
Return on Assets	-0.009	0.074	0.088	0.081
	0.029	0.072	0.078	0.066
	0.331	0.205	0.172	0.156
Investment	4965	50145	153381	1053719
	0	0	26191	158321
	192913	392001	835966	9567398
Firm Age (in years)	7.627	9.763	11.431	14.504
	5	7	9	11
	9.107	9.809	10.578	13.872
FINANCING				
Cash Holding	0.329	0.259	0.226	0.175
	0.258	0.194	0.159	0.096
	0.281	0.234	0.218	0.200
Total Liabilities / Assets	0.869	0.810	0.775	0.728
	0.784	0.825	0.816	0.776
	0.613	0.293	0.228	0.216

Table 1. Continued

ST Debt / Total Debt	0.832	0.759	0.712	0.654
	1	0.879	0.813	0.732
	0.266	0.285	0.304	0.322
Dividends / Net Income	0.141	0.268	0.302	0.264
	0	0	0	0
	0.420	0.539	0.554	0.527
Rating	0.401	0.470	0.537	0.632
	0.44	0.5	0.57	0.66
	0.175	0.176	0.171	0.169
OWNERS				
CEO Share	52.611	48.873	41.811	24.777
	50	50	37	0
	37.170	37.589	37.937	34.099
Largest Owner's Share	68.168	67.370	65.563	62.053
	60	60	60	52
	27.686	27.502	27.990	29.358
Family Firm (dummy)	0.599	0.646	0.616	0.484
	1	1	1	0
	0.490	0.478	0.486	0.500
Institutional Share	0.336	0.739	1.240	1.892
	0	0	0	0
	5.008	7.621	9.949	11.720
State Share	0.213	0.273	0.402	1.166
	0	0	0	0
	3.390	4.015	4.822	8.242
CEO in Largest Family	0.648	0.685	0.643	0.4720
	1	1	1	0
	0.478	0.465	0.479	0.499
OTHER				
Number of observations	136287	145664	145955	141757
Number of Unique Firms	52041	50568	45138	36223

Table 2: Negative and Positive Industry Sales Growth Shocks
This table reports descriptive statistics (year, mean sales growth, and the number of firms: N) of industry sales growth shocks. Industry sales growth shocks are defined by the following cut-off levels: -7.2 percent (bottom 11 percent) for negative shocks and 24.9 percent (top 11 percent) for positive shocks over 2000 - 2008; changes in 2000 include data from 1999.

NEGATIVE INDUSTRY SHOCK			
INDUSTRY	Year	Industry Sales Growth	N
multisector	2007	-64.02%	659
energy	2000	-12.03%	143
energy	2004	-9.58%	251
multisector	2000	-9.32%	945
agriculture	2003	-8.79%	1374
energy	2005	-8.17%	257
agriculture	2001	-7.65%	1339
agriculture	2002	-7.22%	1320

POSITIVE INDUSTRY SHOCK			
INDUSTRY	Year	Industry Sales Growth	N
energy	2002	24.93%	180
multisector	2004	26.16%	1991
energy	2006	26.98%	305
construction	2007	27.75%	8508
transport	2005	31.15%	3029
agriculture	2005	35.87%	1676
multisector	2003	37.36%	1587
multisector	2006	58.14%	3728

Table 3: Industry Sales Growth Shocks

The table shows coefficient estimates of industry sales growth shock dummy variable from panel regression specifications similar to Table 4 in Gertler and Gilchrist (1994). Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Regressions contain the following variables with untabulated coefficients: one period lag of the shock (industry sales growth dummy variables), lagged dependent variables, GDP, Inflation, Short Term Rate, Industry and Year dummy variables plus a constant. Regressions are estimated separately for negative and positive industry sales growth shocks. The main sample includes all firms in an industry realizing a shock between 2000 to 2008, as defined in Table 2. Changes and lagged variables include data prior to 2000. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dep. Var.	Size: 1 & 2	Size: 3 & 4
	NEGATIVE INDUSTRY SHOCK	
Δ SALES / ASSETS (t-1)	-0.110**	-0.080***
	(-2.54)	(-4.56)
Δ INVENTORY / ASSETS (t-1)	-0.008*	-0.004
	(-1.82)	(-1.29)
Δ STD / ASSETS (t-1)	-0.030**	-0.021***
	(-2.05)	(-2.68)
	POSITIVE INDUSTRY SHOCK	
Δ SALES / ASSETS (t-1)	0.169***	0.124***
	(5.51)	(8.37)
Δ INVENTORY / ASSETS (t-1)	0.001	0.002
	(0.35)	(0.72)
Δ STD / ASSETS (t-1)	0.015*	0.019***
	(1.72)	(3.72)

Table 4a: Cash Holdings and Changes in Sales

This table reports coefficient estimates of Cash Holding for OLS regressions. The dependent variable is the change in sales to assets during the year of an industry shock. Control variables with untabulated coefficients include Mean Sales Growth (computed from sales growth rates over t-1 and t-2; where t denotes the shock year), HHN (HHN is the Acharya, Almeida, and Campello (2007) measure of high hedging needs), lagged dependent variable, Industry Sales Growth (t, t-1, t-2, t-3), Δ Number of Employees / Assets (t-1), Return on Assets (t-1), Account Payable Turnover (t-1), Account Payable (t-1) / Assets (t-1), Account Receivable (t-1) / Assets (t-1), the logarithm of Firm Age, Bank Overdraft (t-1) / Total Liabilities (t-1), Dividends (t-1) / Net Income (t-1), Rating, PP&E (t-1) + Inventory (t-1) / Assets (t-1), Total Liabilities (t-1) / PP&E (t-1) + Inventory (t-1), MRDOL (Mandelker and Rhee (1984) measure of operating leverage), Percentage change of liabilities, Percentage change of equity, CEO Share, Ownership Herfindahl, Institutional Share, State Share, Largest Owner's Share, Second Largest Owner's Share, and Family Firm, CEO member of Largest Family, Industry and Year dummy variables plus a constant. The main sample includes all firms in an industry realizing a shock between 2000 to 2008, as defined in Table 2. Changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	NEGATIVE INDUSTRY SHOCK	POSITIVE INDUSTRY SHOCK
Dep. Var. / In-Dep. Var.	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)
Cash Holding (t-1) / Assets (t-1)	0.0715	-0.089
	(0.73)	(-0.82)
Also includes industry dummies, year dummies, and other control variables		
N	2394	10711
adj. R^2	0.139	0.106

Table 4b: Cash Holdings, Changes in Sales, and Firm Size with Industry Shocks
This table reports coefficient estimates for OLS regressions with change in sales to assets during the year of an industry shock as the dependent variable. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. The other control variables are described in Table 4a. Shocks (industry sales growth shocks) are defined in Table 2. The main sample includes all firms in an industry realizing a shock between 2000 to 2008, as defined in Table 2. Changes and lagged variables include data prior to 2000. The no shock sample corresponds to the pooled data after filters and excludes the observations in the negative and positive industry shock samples. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	NEGATIVE INDUSTRY SHOCK		POSITIVE INDUSTRY SHOCK		NO SHOCK (POOLED)	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4
Dep. Var. / In-Dep. Var.	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)
CASH HOLDING (t-1) / ASSETS (t-1)	0.331**	-0.082	-0.163	-0.021	-0.043	0.027
	(1.97)	(-0.69)	(-0.77)	(-0.17)	(-1.34)	(1.19)
MEAN SALES GROWTH	0.004	-0.000	-0.000	-0.002***	-0.000	0.000**
	(0.27)	(-0.24)	(-0.37)	(-3.59)	(-0.79)	(2.51)
HHN	0.106*	-0.049	0.168**	0.141***	0.052***	0.100***
	(1.77)	(-1.03)	(2.27)	(3.11)	(5.14)	(9.65)
Also includes industry dummies, year dummies, and other control variables						
N	1037	1357	4291	6420	94342	123303
adj. R^2	0.142	0.194	0.055	0.222	0.074	0.112

Including macro variables (changes in GDP, inflation, and over-night lending rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions. HHN is estimated using data: t, t-1, t-2. Using HHN based on data t-1, t t+1 or t, t+1, t+2 (consistent with Acharya, Almeida, and Campello (2007)) yield qualitatively similar results. Sorts on size are performed only for firms that experience a (positive / negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

Table 4c: Average of Lagged Cash Holdings, Firm Performance and Firm Size with Industry Shocks

This table reports coefficient estimates for OLS regressions with change in sales to assets during the year of an industry shock as the dependent variable. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. Avg Cash Holding / Assets is the average ratio of Cash to Assets from year t-3 to year t-1 prior to the shock. The other control variables are described in Table 4a. Shocks (industry sales growth shocks) are defined in Table 2. The main sample includes all firms in an industry realizing a shock between 2000 to 2008, as defined in Table 2. Changes and lagged variables include data prior to 2000. The no shock sample corresponds to the pooled data after filters and excludes the observations in the negative and positive industry shock samples. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dep. Var. / In-Dep. Var.	NEGATIVE INDUSTRY SHOCK		POSITIVE INDUSTRY SHOCK		NO SHOCK (POOLED)	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4
	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)
AVG. CASH HOLDING / ASSETS	0.320**	0.002	0.087	0.139	0.050*	0.096***
	(2.10)	(0.02)	(0.61)	(1.26)	(1.67)	(4.59)
MEAN SALES GROWTH	0.003	-0.000	-0.000	-0.002***	-0.000	0.000**
	(0.18)	(-0.24)	(-0.41)	(-3.63)	(-1.12)	(2.52)
HHN	0.106*	-0.048	0.175**	0.144***	0.053***	0.101***
	(1.76)	(-1.00)	(2.44)	(3.17)	(5.26)	(9.74)
Also includes industry dummies, year dummies, and other control variables						
N	1037	1357	4290	6420	94318	123287
adj. R^2	0.141	0.193	0.055	0.223	0.074	0.112

Including macro variables (changes in GDP, inflation, and over-night lending rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions. HHN is estimated using data: t, t-1, t-2. Using HHN based on data t-1, t t+1 or t, t+1, t+2 (consistent with Acharya, Almeida, and Campello (2007)) yield qualitatively similar results. Sorts on size are performed only for firms that experience a (positive / negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

Table 4d: Cash Holdings, Changes in Sales, and Firm Size with Industry Shocks

Difference – in – Difference –in - Difference Specification

This table reports coefficient estimates for OLS regressions. The dependent variable is the change in sales to assets during the year of a negative industry shock. Negative Shock is set to one during negative industry shocks that are defined in Table 2 and zero years when a negative shock does not occur. Small Firm is set to one for firms with assets less than the sample median and zero for firms with assets greater than the median. High Cash is set to one for firms with a ratio of cash to assets in the top quartile of the sample and zero otherwise. The other control variables are described in Table 4a. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	Δ SALES / ASSETS (t-1)
MEAN SALES GROWTH	-0.001
	(-1.11)
HHN	0.139***
	(3.85)
Negative Shock	-0.074
	(-0.30)
Small Firm	-0.045
	(-1.18)
High Cash	-0.008
	(-0.25)
Negative Shock * Small Firm	0.078*
	(1.83)
Negative Shock * High Cash	-0.109**
	(-2.19)
Small Firm * High Cash	-0.017
	(-0.37)
Negative Shock * Small Firm * High Cash	0.152**
	(2.08)
Also includes industry dummies, year dummies, and other control variables	
N	13105
adj. R-sq	0.109

Table 5a: Cash Holdings, Changes in Sales, and Firm Size with Macro Shock
This table reports coefficient estimates for OLS regressions. The dependent variable with change in sales to assets during the negative shock to GDP growth in 2009 as the dependent variable. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. The other control variables are described in Table 4a. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

| | NEGATIVE MACRO SHOCK | |
| | Size: 1 & 2 | Size: 3 & 4 |
Dep. Var. / In-Dep. Var.	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)
CASH HOLDING (t-1) / ASSETS (t-1)	0.203**	0.015
	(2.05)	(0.42)
Mean Sales Growth	0.008	0.000
	(0.95)	(0.52)
HHN	-0.007	0.032
	(-0.23)	(0.97)
N	11986	16586
adj. R^2	0.066	0.065

In the regressions HHN are backward looking using data: t, t-1, t-2.

Global sorts based on all firms that pass our filters yield qualitatively similar results.

Including macro variables (Δ GDP, Inflation and Average Over-Night Lending Rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions.

Table 5b: Average of Lagged Cash Holdings, Changes in Sales, and Firm Size with Macro Shock

This table reports coefficient estimates for OLS regressions. The dependent variable with change in sales to assets during the negative shock to GDP growth in 2009 as the dependent variable. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Avg Cash Holding / Assets is the average ratio of Cash to Assets from year t-3 to year t-1 prior to the shock. The other control variables are described in Table 4a. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	NEGATIVE MACRO SHOCK	
	Size: 1 & 2	Size: 3 & 4
Dep. Var. / In-Dep. Var.	Δ SALES / ASSETS (t-1)	Δ SALES / ASSETS (t-1)
AVG. CASH HOLDING / ASSETS	0.368***	0.241***
	(4.15)	(6.66)
Mean Sales Growth	0.009	0.000
	(0.98)	(0.12)
HHN	0.001	0.040
	(0.04)	(1.19)
N	11986	16586
adj. R^2	0.067	0.067

In the regressions HHN are backward looking using data: t, t-1, t-2.

Global sorts based on all firms that pass our filters yield qualitatively similar results.

Including macro variables (Δ GDP, Inflation and Average Over-Night Lending Rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions.

Table 6: Changes around Shocks

This table reports median percentage change in operational and financial activities during the year of a shock. The main sample for the negative industry shocks is from 2000 to 2008 and defined in Table 2. The Macroeconomic shock sample: 2009; changes and lagged variables include data prior to 2009. * p < 0.1, ** p < 0.05, *** p < 0.01* p < 0.1, ** p < 0.05, *** p < 0.01 non-parametric test (wilcoxon/ rank sums) whether medians are zero.

	SMALL	LARGE	p-value	SMALL-LOW	SMALL-HIGH	p-value	LARGE-LOW	LARGE-HIGH	p-value
PANEL A				NEGATIVE INDUSTRY SHOCK					
Δ INVENTORY / INVENTORY (t-1)	-2.39***	3.57***	0.00	-2.89***	-2.38***	0.13	2.50***	5.10***	0.15
Δ EMPLOYEES / EMPLOYEES (t-1)	0.00***	0.00***	0.11	0.00***	0.00***	0.72	0.00***	0.00***	0.91
Δ INVESTMENT / INVESTMENT (t-1)	-79.53***	-66.99***	0.00	-82.76***	-74.85***	0.06	-72.60***	-57.10***	0.01
Δ ASSETS / ASSETS (t-1)	-3.94***	1.34***	0.00	-4.96***	-2.50***	0.00	1.23***	1.58***	0.82
N	2992	2996		1192	1477		1615	1254	
PANEL B				NEGATIVE MACRO SHOCK					
Δ INVENTORY / INVENTORY (t-1)	-2.07***	-2.07***	0.05	-4.57***	-2.07***	0.00	-3.93***	-0.79***	0.00
Δ EMPLOYEES / EMPLOYEES (t-1)	0.00***	0.00***	0.00	0.00***	0.00***	0.00	0.00***	0.00***	0.00
Δ INVESTMENT / INVESTMENT (t-1)	-86.42***	-73.76***	0.00	-84.28***	-88.36***	0.00	-74.48***	-72.95***	0.03
Δ ASSETS / ASSETS (t-1)	-3.76***	-0.93***	0.00	-5.12***	-2.07***	0.00	-2.03***	1.80***	0.00
N	32659	34158		13321	17773		19569	14154	

Sorts on size are performed only for firms that experience a (positive / negative) industry shock or 2009 macro shock. Global sorts based on all firms that pass our filters yield qualitatively similar results.

Table 7: Cash Savings

Coefficient estimates for OLS regressions. Csh holdings before negative industry sales shock is the dependent variable. The sources of cash savings, i.e., the explanatory variables, include Operating Cash Flows / Assets, (Operating Cash Flows - Dividends) / Operating Cash Flows, Δ Liabilities / Assets, Δ Equity / Assets with the following timing: t-1, t-2 and t-3 (in Panel A) or means thereof (in Panel B). Δ Equity is defined as changes in paid-in capital and excludes retained earnings. The regressions also include the cash savings at t-4 and a constant as well as untabulated Industry and Year dummy variables. Operating Cash Flows - Dividends is set to zero if operating cash flows are negative or if dividends exceed operating cash flows. Main sample: 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Dep. Var. / In-Dep. Var.	SMALL CASH (t-1) / ASSETS (t-1)	LARGE CASH (t-1) / ASSETS (t-1)	SMALL-HIGH CASH (t-1) / ASSETS (t-1)	SMALL-LOW CASH (t-1) / ASSETS (t-1)	LARGE-HIGH CASH (t-1) / ASSETS (t-1)	LARGE-LOW CASH (t-1) / ASSETS (t-1)
			PANEL A			
OPCF (t-1) / ASSETS (t-1)	0.083*	0.136***	0.052	0.010***	0.122***	0.000
	(1.79)	(8.43)	(1.27)	(2.82)	(7.04)	(0.01)
OPCF–DIV (t-1) / OPCF (t-1)	-0.005	0.004	0.018	-0.001	0.006	0.004**
	(-0.28)	(0.49)	(1.08)	(-0.56)	(0.57)	(2.49)
Δ LIABILITIES (t-1) / ASSETS (t-2)	-0.003	-0.000	-0.000	0.000	-0.003***	0.000**
	(-1.11)	(-0.49)	(-0.01)	(0.28)	(-3.05)	(2.03)
Δ EQUITY (t-1) / ASSETS (t-2)	0.009	0.005	0.086	-0.008	0.074***	0.001
	(0.22)	(0.29)	(1.23)	(-1.31)	(4.01)	(0.83)
OPCF (t-2) / ASSETS (t-2)	0.014	0.105***	0.025*	-0.001***	0.083***	0.001
	(1.40)	(6.45)	(1.91)	(-2.95)	(3.27)	(0.42)
OPCF–DIV (t-2) / OPCF (t-2)	0.026***	0.009	0.022	0.003	0.020*	0.001
	(2.65)	(1.18)	(1.52)	(1.40)	(1.69)	(0.81)
Δ LIABILITIES (t-2) / ASSETS (t-3)	-0.000	-0.000***	-0.000	-0.000***	-0.001***	-0.000***
	(-0.45)	(-4.24)	(-0.49)	(-5.09)	(-11.57)	(-4.50)
Δ EQUITY (t-2) / ASSETS (t-3)	-0.032	-0.000	0.010	0.001	-0.024**	0.000**
	(-1.18)	(-0.36)	(0.17)	(0.52)	(-2.10)	(2.32)
OPCF (t-3) / ASSETS (t-3)	0.003	0.012**	-0.002	-0.000	0.0325	0.001*
	(1.01)	(2.00)	(-0.12)	(-0.19)	(1.42)	(1.94)

Table 7. Continued

OPCF–DIV (t-3) / OPCF (t-3)	0.030***	0.037***	0.033**	0.002	0.032***	0.000
	(3.23)	(5.46)	(2.34)	(0.79)	(2.79)	(0.33)
Δ LIABILITIES (t-3) / ASSETS (t-4)	-0.000***	-0.000***	-0.000***	-0.000	-0.000***	0.000
	(-2.67)	(-4.04)	(-4.06)	(-0.19)	(-5.17)	(0.59)
Δ EQUITY (t-3) / ASSETS (t-4)	-0.008	-0.000	-0.004	-0.006**	-0.000	-0.000***
	(-0.46)	(-0.26)	(-0.19)	(-2.38)	(-0.89)	(-5.05)
CASH (t-4) / ASSETS (t-4)	0.534***	0.425***	0.445***	0.041***	0.421***	0.018***
	(16.87)	(13.87)	(13.14)	(5.28)	(12.06)	(3.72)
CONSTANT	0.029**	0.049***	0.128***	0.020***	0.196***	0.025***
	(2.11)	(5.48)	(6.27)	(8.32)	(4.66)	(3.84)
N	1691	2278	911	780	1041	1237
adj. R^2	0.373	0.357	0.303	0.090	0.331	0.094
				PANEL B		
MEAN OPCF / ASSETS	0.011	0.108**	0.058**	0.000	0.250***	0.000
	(1.20)	(2.12)	(2.10)	(0.74)	(5.67)	(0.22)
MEAN OPCF–DIV / OPCF	0.073***	0.084***	0.067***	0.005*	0.055***	0.006***
	(4.10)	(4.58)	(2.71)	(1.69)	(2.63)	(2.71)
MEAN Δ LIABILITIES / ASSETS	-0.001**	-0.000	-0.000***	-0.001*	-0.001***	0.000
	(-2.33)	(-1.35)	(-3.26)	(-1.86)	(-4.03)	(0.81)
MEAN Δ EQUITY / ASSETS	-0.043	-0.001*	0.023	-0.011*	-0.001	-0.000***
	(-0.79)	(-1.74)	(0.32)	(-1.93)	(-1.06)	(-7.10)
CASH (t-4) / ASSETS (t-4)	0.533***	0.418***	0.439***	0.041***	0.392***	0.018***
	(16.59)	(13.77)	(12.78)	(5.29)	(11.14)	(3.98)
CONSTANT	0.020	0.034***	0.135***	0.018***	0.189***	0.023***
	(1.57)	(3.23)	(6.65)	(7.97)	(4.32)	(3.56)
N	1691	2278	911	780	1041	1237
adj. R^2	0.348	0.305	0.295	0.084	0.301	0.094

* p < 0.1, ** p < 0.05, *** p < 0.01

Table 8: Source of Financing around Shocks
This table reports median percentage change for sources of ex-post financing, i.e., financing over a shock year. Main sample for negative industry shocks: 2000 to 2008; changes and lagged variables include data prior to 2000. Shocks (industry sales growth shocks) are defined in Table 2. The macroeconomic shock sample is all firms in 2009; changes and lagged variables include data prior to 2009. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ come from non-parametric tests (wilcoxon / rank sums) whether medians are zero.

	SMALL	LARGE	p-value	SMALL-LOW	SMALL-HIGH	p-value	LARGE-LOW	LARGE-HIGH	p-value
PANEL A				NEGATIVE INDUSTRY SHOCK					
Δ LIABILITIES / ASSETS (t-1)	-2.15***	1.46***	0.00	-2.56***	-1.58***	0.10	2.02***	0.41***	0.00
Δ LONG-TERM LIAB. / ASSETS (t-1)	-0.61***	-1.05***	0.00	-2.60***	-0.04***	0.00	-1.72***	-0.43***	0.11
Δ SHORT-TERM LIAB. / ASSETS (t-1)	0.62***	1.93***	0.00	0.72***	0.52***	0.59	2.55***	1.19***	0.00
Δ EQUITY / ASSETS (t-1)	-0.17***	-0.07***	0.00	-0.16***	-0.17***	0.24	-0.07***	-0.06***	0.03
Δ (AP-AR) / ASSETS (t-1)	0.00***	-0.03***	0.05	0.08***	-0.14***	0.00	0.13***	-0.36***	0.00
Δ CASH HOLDING / ASSETS (t-1)	0.00***	0.00***	0.98	0.42***	-3.31***	0.00	0.03***	-2.45***	0.00
N	2992	2996		1192	1477		1615	1254	
PANEL B				NEGATIVE MACRO SHOCK					
Δ LIABILITIES / ASSETS (t-1)	-3.23***	-2.55***	0.00	-3.85***	-2.74***	0.00	-2.95***	-1.80***	0.00
Δ LONG-TERM LIAB. / ASSETS (t-1)	0.00***	-0.14***	0.08	-0.19***	0.00***	0.00	-1.21***	0.00***	0.00
Δ SHORT-TERM LIAB. / ASSETS (t-1)	-0.85***	-0.63***	0.01	-0.43***	-1.30***	0.02	-0.53***	-0.84***	0.56
Δ EQUITY / ASSETS (t-1)	-0.24***	-0.08***	0.00	-0.24***	-0.24***	0.01	-0.09***	-0.07***	0.05
Δ (AP-AR) / ASSETS (t-1)	0.00***	0.00***	0.01	0.13***	0.00**	0.00	0.00***	0.00	0.00
Δ CASH HOLDING / ASSETS (t-1)	-0.00***	0.15***	0.00	0.55***	-3.32***	0.00	0.26***	-0.97***	0.00
N	32659	34158		13321	17773		19569	14154	

Table 9: Cash Holdings and Firm Exit with Negative Industry Shocks

This table reports coefficient estimates of Cash Holding from logistical regressions with exit (1) or survival (0) as the dependent variable for firms in negative shock industries. Panel A includes all firms. Panel B excludes firms that left the sample because of a merger. Firms are sorted by assets. Size 1 and 2 have fewer assets than the sample median. Size 3 and 4 have greater assets than the sample median. The other control variables are described in Table 4a. The main sample includes all firms in an industry realizing a shock between 2000 to 2008, as defined in Table 2. Changes and lagged variables include data prior to 2000. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	t-1 EXIT		t EXIT		t+1 EXIT	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1& 2	Size: 3 & 4
Panel A						
CASH HOLDING (t-1) / ASSETS (t-1)	-1.085	-0.216	-1.945***	-0.187	-2.172**	0.351
	(-1.39)	(-0.39)	(-2.96)	(-0.40)	(-2.75)	(0.68)
Also includes industry dummies, year dummies, and other control variables						
N	809	1324	1120	2002	1018	1357
Prob. χ^2	0.032	0.000	0.001	0.000	0.000	0.000
Pseudo R^2	0.052	0.062	0.055	0.049	0.119	0.058
Panel B						
CASH HOLDING (t-1) / ASSETS (t-1)	-1.051	0.474	-2.069***	0.0768	-2.282***	0.569
	(-1.32)	(0.63)	(-3.09)	(0.13)	(-2.80)	(0.87)
Also includes industry dummies, year dummies, and other control variables						
N	765	1042	1056	1557	946	989
Prob. χ^2	0.022	0.000	0.002	0.0000	0.000	0.000
Pseudo R^2	0.057	0.097	0.054	0.060	0.118	0.086

HHN are backward looking using data: t, t-1, t-2.

Table 10: Cash Holdings and Changes in Market Share with Negative Industry Shocks

This table reports coefficient estimates of Cash Holding from OLS regressions with change in market share as the dependent variable. The other control variables are described in Table 4a. The main sample includes all firms in an industry realizing a shock between 2000 to 2008, as defined in Table 2. Changes and lagged variables include data prior to 2000. Error terms are corrected for clustering at the firm level. T-statistics are in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

	from t-1 to t		from t-1 to t+1		from t-1 to t+2	
	Size: 1 & 2	Size: 3 & 4	Size: 1 & 2	Size: 3 & 4	Size: 1& 2	Size: 3 & 4
CASH HOLDING (t-1) / ASSETS(t-1)[a]	0.007*	-0.099	0.008	-0.133*	0.010	-0.152*
	(1.67)	(-1.10)	(1.10)	(-1.73)	(1.10)	(-1.88)
Also includes industry dummies, year dummies, and other control variables						
N	1037	1357	892	1128	810	1067
Adj R²	0.235	0.263	0.116	0.281	0.145	0.113

[a] The coefficient on the cash holding variable is multiplied by 100 because of the small magnitude of the change in market share variable.

Including macro variables (Δ GDP, Inflation and Average Over-Night Lending Rates) lead to identical coefficient estimates as long as year dummy variables are included in the regressions.

In the regressions HHN are backward looking using data: t, t-1, t-2.

Sorts on size are performed only for firms that experience a (negative) shock. Global sorts based on all firms that pass our filters yield qualitatively similar regressions results.

BANCO DE ESPAÑA PUBLICATIONS

WORKING PAPERS